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Applicant/Owner: Gustav Klauke GmbH, 42855 Remscheid/Germany  
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SCHMIDT C.

**PATENT APPLICATION**

**CABLE LUG**

**Gustav Klauke GmbH  
Auf dem Knapp 46  
D-42855 Remscheid**

**VGN 265 098 25308DE mue/an 15 October 2004**

## Cable lug

The invention relates to a cable lug with a tubular receiving portion for the cable and an integrally formed flat part connecting portion which has a hole, and a preferably rotatable functional part, such as for example a nut, which is held captively on the flat part connecting portion, the functional part being held by a reshaped holding material portion of the flat part connecting portion which projects into an undercut formed on the functional part.

Various configurations of cable lugs of this type are already known. Reference is to be made, for example, to DE 10310164 A1.

In the known cable lug, the holding material portion is formed by a raised element, which is directed towards a head of the functional part and digs-in to a small extent into the upper flat side of the cable lug, the raised element being in particular able to be integrally formed directly on the functional part. The holding material portion is formed to project to only an insignificant extent underneath the said upper surface of the flat portion of the cable lug. Otherwise an underside of the head of the functional part engages in a planar manner against the associated upper side of the flat part of the cable lug.

The invention is directed to the task of developing the known cable lug to the effect that a functionally secure configuration is provided also for a rotatable mounting of the functional part.

This objective is met by the subject matter of Claim 1, it being provided that the holding material portion is rooted in a portion of the flat part connecting portion which is sunk-in in a step-like manner with respect to

a surrounding region of the flat part connecting portion. By the said sinking-in being formed, there results - still within the flat part of the cable lug - the possibility of providing deformations of the sides which prevent the functional part from fitting tightly within the flat part of the cable lug. They can be used for a defined lifting of the functional part, by using the elastic portion of the deformation of the cable lug during appropriate pressing-in of the functional part.

In particular, it is also preferred that an abutment surface of the functional part which is on its underside and comes into engagement against the flat part connecting portion is formed in a flat planar manner outside the undercut region. This does not mean that the abutment surface, in so far as every portion of it is concerned, is formed to be horizontal and/or coincident with the upper side of the flat part of the cable lug. Rather it is further preferred that the abutment surface is formed to be step-like - in cross-section - the rising portion consisting of a conical surface which widens upwardly. It is precisely this upwardly widening conical surface that has the effect of engendering a tendency for the functional part to be lifted during a certain spring-back after the pressing-in force has been removed, this being quite significant for the free rotatability of the functional part, this rotatability being as a rule desired.

The functional part may in particular be a nut.

In this case, a collar is integrally formed on the nut on its underside, this being profiled as an undercut by a cut-out coming from the outside. On the nut side, this undercut may merge into a rising portion of a step surface by way of a surface which runs horizontally or at a slope or conically downwards, the step surface then again merging into an outer surface which extends

horizontally or slightly slopingly or conically. The extent of this outer surface, in the case of a nut which is formed for example on its outer side as a hexagon, varies over the periphery. In the middle of a  
5 hexagonal tool surface, this outer surface can also practically not be given.

From the point of view of the method and installation, a procedure is carried out such that the hole in the  
10 flat part of the cable lug is large enough for the neck of the nut, which neck as noted projects downward and has the undercut, to be easily inserted into the hole. A pressing force is then applied to the nut from above, this pressing force causing said stepped area to be  
15 sunk into the material of the flat portion of the cable lug while at the same time bulging out the holding material portion which is formed from the material of the flat part of the cable lug. After the nut is relieved of said pressing force, the nut is captively  
20 secured to the cable lug, the nut being at the same time freely rotatable.

The angle - resulting in a conical surface - of the rising portion of the stepped area is preferably an  
25 acute angle in the range of a few degrees, for example 1 to 15 degrees.

In first instance, the nut with said shaped portions can be produced as a turned part. However it may also  
30 be produced, for example, as an extruded part, said neck portion being integrally formed at the bottom initially in the form of a cylindrical tube, and then in a second step being upset such that the required and described undercut is produced.

35 The cable lug is preferably one which is formed from a solid material, the flat portion then being pressed by reshaping.

Said connection between the nut, which is generally composed of a steel material, or another functional part, and the flat portion of the cable lug is also assisted by the cable lug usually consisting of a comparatively soft material, specifically copper or aluminum.

On account of the described configuration of the functional part, pressing-in produces a characteristic compression curve, in first instance specifically with force rising in a comparatively linear manner along the path and then angling off in a second portion of the compression curve in which the force rises more sharply as plotted over the path. This characteristic allows compression to be controlled in an advantageous manner in relation to the pressing force applied. It is possible to prespecify a typical pressing force which is located to a sufficient extent in the steep region of the curve, and be sure that mounting of the functional part on the cable lug appropriately for its function is achieved in each case when this pressing force is reached.

In addition to the nut which has already been mentioned, the functional part in question may also be a screw. Furthermore, it may also be a sleeve or a mandrel.

The invention is explained in greater detail below with reference to the accompanying drawing which illustrates only exemplary embodiments, and in which

Fig. 1 shows a cable lug with a nut which is associated with the flat part, before pressing;

Fig. 2 shows the item according to Fig. 1, sectioned in the region of the flat part;

- Fig. 3 shows the item according to Fig. 1 in position fitted onto the cable lug;
- 5 Fig. 4 shows a cross-sectional illustration, which corresponds to Fig. 2, of the item according to Fig. 3;
- 10 Fig. 5 shows the item according to Fig. 1 and Fig. 3 in a pressed position;
- Fig. 6 shows a sectional illustration, which corresponds to Fig. 2 and Fig. 4, of the item according to Fig. 5;
- 15 Fig. 7 shows an illustration with a nut screwed onto a threaded connecting pin;
- Fig. 8 shows an illustration of a functional part in the form of a screw;
- 20 Fig. 9 shows the item according to Fig. 8 with a screw seated on the flat part of the cable lug, before pressing.

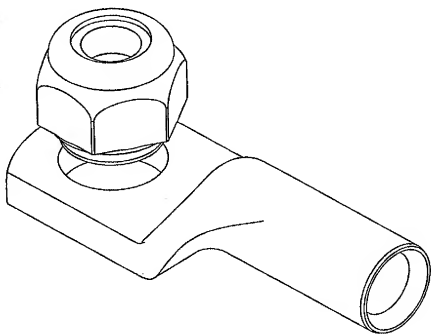
25 All disclosed features are (in themselves) pertinent to the invention. The disclosure content of the associated/accompanying priority documents (copy of the prior application) is also hereby incorporated in its  
30 entirety in the disclosure of the application, including for the purpose of incorporating features of these documents in claims of the present application.

CLAIMS

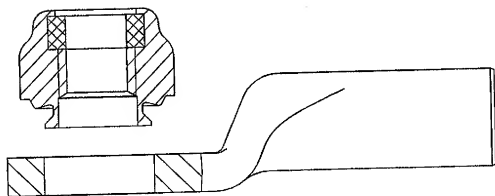
1. Cable lug with a tubular receiving portion for the cable and an integrally formed flat part connecting portion which has a hole, and a preferably rotatable functional part, such as for example a nut, which is held captively on the flat part connecting portion, the functional part being held by a reshaped holding material portion of the flat part connecting portion which projects into an undercut formed on the functional part, characterized in that the holding material portion is rooted in a portion of the flat part connecting portion which is sunk-in in a step-like manner with respect to a surrounding region of the flat part connection portion.
2. Cable lug according to Claim 1 or in particular according thereto, characterized in that the undercut portion of the functional part is formed to extend circumferentially uniformly around the periphery.
3. Cable lug according to one or more of the preceding claims or in particular according thereto, characterized in that an abutment surface of the functional part which is on its underside and comes into engagement against the flat part connecting portion is formed in a flat planar manner outside the undercut region.
4. Cable lug according to one or more of the preceding claims or in particular according thereto, characterized in that the abutment surface is formed to be step-like, the rising portion consisting of a conical surface which widens upwardly.



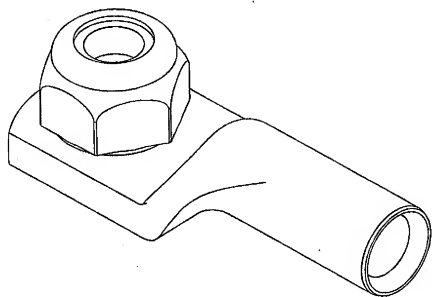
***Fig. 1***



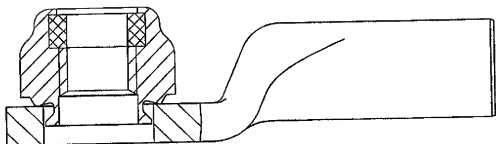
***Fig. 2***



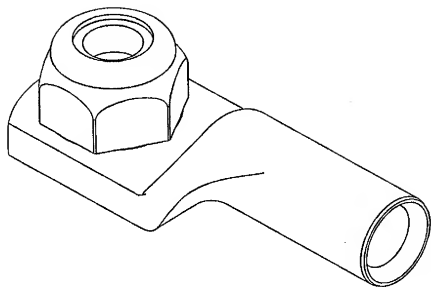
***Fig. 3***



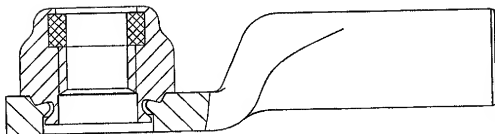
***Fig. 4***



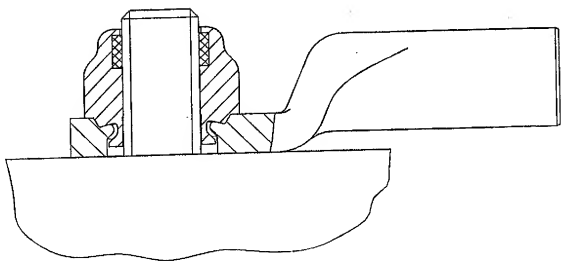
***Fig. 5***



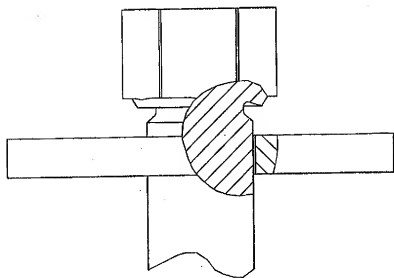
***Fig. 6***



***Fig: 7***



***Fig. 8***



***Fig. 9***

